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Principles of Basic Wound Evaluation and Management in the Emergency Department

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Traumatic lacerations of the skin are one of the most common problems seen and treated in the Emergency Department (ED), accounting for approximately 11 million visits annually [1]. The ED will continue to provide the most available portal to wound care because of 24-hour access and decreasing primary care availability. Provision for effective, safe, and clinically competent wound care will continue to be a priority. Historically, lacerations have been a source of significant litigation against emergency medicine physicians. Because patients and physicians desire the same outcomes of avoidance of infection and an aesthetically appearing repair, a contemporary and disciplined approach to wound management will mitigate such risks and improve patient care and satisfaction [2,3]. This article will review current and fundamental aspects of basic wound management, to include a focused history, methodical physical examination, meticulous wound preparation, effective wound closure techniques, and pertinent postrepair care instructions.

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Wound history

Proper wound management begins with a detailed history of the mechanism of injury as well as the patient's past medical history. Furthermore, the time elapsed from injury is essential in the assessment of possible wound infection, as well as to determine whether or not primary wound repair would be advantageous. Allergies to antibiotics, latex, and local anesthetics should also be documented and considered in wound evaluation and treatment. Obtaining a detailed history will help guide further management, work-up, and final patient disposition.

Mechanism of injury

On presentation clinicians should obtain a full understanding of the mechanism of injury to include the time of the injury and the mechanism of the injury (a cut with a knife or a crush suffered when a finger is caught in a door). As with all injuries, it is important to clearly understand the mechanism so as to provide the clues to the magnitude of the injury. If the injury occurred in the setting of an occupational exposure, there may be particular chemicals, acids, or bases that need to be considered. These types of injuries can result in devitalized tissue that may need debridement as well as ongoing assessment as this wound may continue to evolve over time. Furthermore, certain mechanisms may require more extensive evaluation (ie, bites, injections, and so forth) and possible subspecialty consultation. Finally, wounds occurring in contaminated environments may also dictate further treatment and follow-up.

Anatomical location

Anatomically, lacerations are more likely in adults to occur on the head and neck (50%) and upper extremities (35%), followed by trunk and then lower extremities [4]. Children, however, are noted to have a greater percentage of facial lacerations, as compared with adults [5]. Anatomical location of the injury is important because certain sites, such as the lower extremities, are much more prone to infection, especially when compared with lacerations on the face or scalp, which have improved regional blood flow [6,7]. The site of the wound also dictates the repair technique that would provide the best cosmetic result. The wound closure technique ultimately selected is primarily determined by skin tension and dynamics. Skin with less tension and dynamic forces, such as the face, usually result in smaller scars as do wounds that run parallel to the lines of skin tension. This is in contrast to lacerations over joints and those that run perpendicular to skin tension lines. The concern for the final appearance has practical as well as potential medical legal impact.

Underlying medical history

Predisposing medical issues should also be elicited as they may complicate wound healing or have led to the initial wounding (eg, seizure,

syncope). Specific factors that may impair wound healing and increase the risk of infection include extremes of age, diabetes mellitus, obesity, malnutrition, chronic renal failure, immunosuppressive medications (ie, steroids or chemotherapy), and inherited or congenital connective tissue disorders [8–10]. A patient's healing response to past traumatic injuries, such as keloid production or a hypertrophic scar, should also be ascertained and discussed with the patient as a possible recurrent outcome and increased morbidity. Patients prone to keloid formation should be made aware that with their heritage, keloid formation from the wound is possible. Asian and African American populations have been most identified with keloid formation [11]. Wounds in these individuals may not achieve a full cosmetically acceptable appearance.

Immunization status

Immunization status should also be obtained and documented. The Advisory Committee on Immunization Practices (ACIP; Centers for Disease Control and Prevention [CDC]) recommendations for tetanus vaccination are displayed in Table 1 [12]. Generally, it is recommended that adults have tetanus toxoid every 10 years. In cases of markedly contaminated wounds and no history of tetanus toxoid in the previous 5 years, then tetanus immune globulin is also indicated. Discussion regarding updating of pertussis for adults is currently ongoing. A newly licensed tetanus-diphtheria-acellular-pertussis vaccine (Tdap) is available for adults. ACIP recommendations for use for tetanus prophylaxis in wound management are

Table 1
Summary guide to tetanus prophylaxis in routine wound management for adults (19 years and older)

	Clean minor wounds		All other wounds[a]	
History of tetanus immunization	Td[b]	TIG	Td	TIG
Fewer than 3 or uncertain doses	Yes	No	Yes	Yes
More than 3 doses				
Last dose within 5 y	No	No	No	No
Last dose within 5–10 y	No	No	Yes	No
Last dose more than 10 y earlier	Yes	No	Yes	No

Note: ACIP recommendations from 3/2/2006 that all adults 19 to 64 receive tetanus-toxoid, diphtheria, and acellular pertussis vaccine (Tdap) for tetanus wound prophylaxis unless previously received. These recommendations are under review by the CDC and not formally approved.

Abbreviations: Td, tetanus-diphtheria toxoid; TIG, tetanus immune globulin.

[a] Such as contaminated wounds (feces, dirt, saliva, soil), puncture wounds, avulsions, burns, crush injuries, and frostbite [13].

[b] Tdap is preferred to Td for adults who have never received Tdap. Td is preferred to TT for adults who received Tdap previously or when Tdap is not available. If TT and TIG are both used, tetanus toxoid absorbed rather then tetanus toxoid for booster use only (fluid vaccine) should be used.

that Tdap should be used if the adult (19–64) has not received this preparation previously [13]. The vaccine is currently not licensed for use in individuals older than 64 years.

Antibiotic coverage

With regard to wound factors obtained in the history that may necessitate antibiotic coverage, high bacterial counts have been seen in animal bites, soil contamination, crush injury, and stellate lacerations, which are all risk factors for infection [4]. In addition, it is also generally accepted that wounds involving normally sterile sites such as tendons, joints, or bones are at increased risk for infection. Finally, puncture wounds, intraoral lacerations, and most mammalian bites are considered to be infection-prone wounds. Prophylactic antibiotics, as recommended in the article by Nakamura and Daya elsewhere in this issue, may then be required because of the increased risk of infection.

Patient's symptoms

Finally, documentation of the patient's symptoms is important. Does the patient experience paresthesia or loss of sensation? These symptoms may represent a neurologic and/or vascular injury. Does the patient complain of severe pain? This complaint may represent an underlying fracture, foreign body, or serious medical condition (eg, compartment syndrome, necrotizing fascitis). Finally, potential for foreign body exposure to glass, wood, plant, or organic materials should be discussed and documented.

Wound examination

Examination

Careful and meticulous examination of a wound is critical to wound management. Examination begins with an adequate setting to include sufficient lighting to help identify foreign bodies as well as underlying nerve, tendon, vascular, and joint involvement. Typically, if deep structures are involved, the wound may not be a candidate for primary closure in the ED and may necessitate specialty consultation. However, one possible exception is an extensor tendon laceration. Joints with overlying wounds should be completely flexed and extended with examination of the tendons through their full range of motion to assess for possible injury. Joint capsule penetration should also be identified because intraoperative evaluation, irrigation, and repair may be necessary.

Hemostasis

A hemostatic or bloodless field should be established to facilitate adequate visualization of anatomical structures and to assess for the presence

of obvious contamination, infection, or devitalized tissue. If, despite persistent direct pressure, the wound continues to bleed, a sphygmomanometer may be inflated proximal to the wound to a level greater than the patient's systolic blood pressure for approximately 20 to 30 minutes at a time. A tightly fitting sterile glove may also be used with digital lacerations to establish hemostasis. For severe hemorrhage, there are now a number of commercial tourniquets [14] and newer hemostatic agents (HemCon Bandage, QuickClot) [15–17] that have recently been used successfully to control life-threatening hemorrhage.

Neurovascular exam

A detailed neurovascular exam should be obtained before the application of anesthesia and repair of the wound. An adequate vascular exam should include presence of pallor or cyanosis, visualization of capillary refill, and the palpation of pulses distal to the wound to assess for adequate perfusion. Motor and sensory function should be evaluated with an accompanying in-depth knowledge of the nerve innervation to the area around and distal to the wound. Muscle groups, including flexor and extensor tendons, near the injury should be evaluated. Two-point discrimination should be used to evaluate and document digital nerve injuries with the normal being 2 to 5 mm over digits and 7 to 12 mm over the palm [18]. An efficient and readily accessible method to perform two-point discrimination is through the use of a calibrated, standard-sized paper clip [19].

Foreign body

Failure to identify foreign bodies may lead to complications such as inflammation, increased risk of infection, delayed wound healing, and loss of function. In a retrospective study of patients with hand wounds, nearly 38% had foreign bodies that were missed by the treating physician on initial wound inspection. As previously mentioned, retained foreign bodies are a source of significant litigation accounting for 14% of lawsuits and 5% of all legal settlements [2].

Once a foreign body has been identified a decision must be made to remove it or not. Extraction is based on the type of object, its location, overall risk of infection, and risk of complications with the removal process. For example, objects that impinge on a neurovascular structure and joints or restrict mechanical function should be considered for removal. This may require surgical consult with possible intraoperative removal. This is in contrast to small, inert foreign objects, such as a minute piece of glass, away from vital structures that may be electively left in place [20,21]. If the foreign body is left in place, the patient should be advised and concur with the clinical decision-making process.

Radiography

Plain radiography has traditionally been the screening method of choice for retained foreign bodies; however, only radiopaque objects, such as metal, rocks, and some types of glass, may be reliably detected. Radiolucent foreign bodies like plastic and wood products are frequently missed, with glass being the most common unidentified foreign body, accounting for 50% of all retained objects [22]. Several studies demonstrated that glass larger than 2 mm can be reliably detected by x-ray [23,24]. Flom and Ellis [25] performed an in vitro study comparing x-ray, CT, and ultrasound and found that ultrasound was better able to detect plastic, wood, and glass when compared with the other two methods. Sensitivities and specificities of foreign body detection with ultrasound have each been reported to be as high as 98% [26]; however, accuracy in this study was found to be dependent on the physical model used, the experience of the sonographer, and the size of the foreign body. CT is able to identify wood splinters and plastic foreign bodies; however, if a wood object is left in the wound for more than 48 hours the wood absorbs water and develops a density similar to soft tissue [27,28]. Finally, MRI, although very accurate in detecting foreign bodies, is not practical for routine use.

Wound preparation

Anesthesia

Once the wound has been examined, adequate anesthesia and pain medication should be administered. Local anesthetic agents are classified into two major groups, amides and esters; dosing is described in Table 2. Patients with an allergy to a member of the ester anesthetic may still be treated with an anesthetic from the amide group, and vice versa. In several studies, patients were primarily allergic to the preservative agent instead of the anesthetic itself as allergies specific to the anesthetic agents are extremely rare [29–33]. Therefore, if available, it may be possible to give an anesthetic without the preservative to these patients. In rare instances, patients may report allergies to both major groups or be unable to specify an allergy to an anesthetic. In such cases, it has been shown that locally injected

Table 2
Local anesthetic properties

Anesthetic, with epinephrine	Class	Maximal dose (mg/kg)	Duration of action
Lidocaine	Amide	5	1–2 h
		7	2–4 h
Bupivacaine	Amide	2	4–8 h
		3	8–16 h
Procaine	Ester	7	15–45 min
		9	30–90 min

diphenhydramine has analgesic properties equivalent to 1% lidocaine; however, disadvantages of diphenhydramine as a local anesthetic include a higher level of discomfort upon initial infiltration as well as a slower onset of action (5 minutes versus 1 to 2 minutes) [34,35]. Benzyl alcohol is another alternative anesthetic for the multi-allergic patient and can be as effective as 1% lidocaine, with less discomfort upon injection when compared with diphenhydramine [36].

Anesthetics may be administered directly into the wound, topically, or via regional nerve blocks. Singer and colleagues [37] describes several ways to reduce pain with local infiltration, including adding sodium bicarbonate, warming the local anesthetic, using smaller gauge needles, injecting the anesthetic at a slower rate, infiltrating the anesthetic through the edge of the wound, and by pretreating the wound with a topical anesthetic.

Topical anesthetics may also be used for patients with aversions to needles, such as small children, or as an adjunct to pain management. The most common topical anesthetic agents are LET (lidocaine, epinephrine, and tetracaine), TAC (tetracaine, adrenaline, and cocaine), and EMLA (eutectic mixture of local anesthetics). LET, a popular agent with a widely accepted safety profile, has been found to be an effective anesthetic in 75% to 90% of cases that occur on the face and scalp [38–40] TAC, on the other hand, is rarely used and has been associated with seizures, cardiac arrhythmias, and death [41]. EMLA has been found to be much more effective than TAC, requiring additional injected anesthesia when compared with TAC (15% versus 55%). EMLA, however, has a longer time of onset when compared with TAC (55 versus 29 minutes) [42]. Use of a topical anesthetic is dependent on a wound site that is highly vascularized so the agent can be effectively absorbed and distributed. The appearance of blanched skin where the topical analgesic is placed is indicative of effective topical anesthesia.

Epinephrine in combination with a local anesthetic may also be administered to help obtain hemostasis and to increase the duration of anesthesia; however, sites such as digits and the tip of the nose, ears, and penis should not be anesthetized with epinephrine because of the risk of necrosis secondary to the vasoconstriction of end-arterioles. Supplemental epinephrine has, however, been used safely when anesthetizing the nose and periphery of the ear [43].

A regional nerve block is also another effective method of achieving adequate wound anesthesia without distorting wound margins. This method is also useful for large wounds that may require potentially toxic doses of local anesthetic as well as for wounds in which local infiltration may be too painful to tolerate. This technique, as well as procedural sedation, is described by Crystal and Harrison elsewhere in this issue.

Sterile technique

Sterile technique for wound closure has been recommended. In 2004, Perelman and colleagues [44] published their study to look at the use of

sterile versus nonsterile gloves. Their study used clean nonsterile gloves in the treatment of uncomplicated wounds and compared the rate of infection. In this cohort of patients, they report there was no significant difference in the incidence of infection. Current recommendations are for sterile nonpowder gloves, which are latex free. Universal precautions would mandate single gloving with all patients and consider double gloving in the situation of a patient with a communicable disease such as the human immunodeficiency virus or hepatitis.

Hair removal

Removal of the hair around wound sites has been associated with increased wound infection rates, thought to be secondary to the damage to intact skin from a razor. Most studies have been done in the preoperative setting for elective surgery. In this setting using a clipper has been thought to cause less skin damage and decrease the tissue injury. Although some references will encourage hair removal to ease wound closure, others suggest that the presence of the hair assists as a guide in approximating wound edges [45]. Eyebrow removal is discouraged because regrowth doesn't consistently occur. In the ED, lubrication with antibacterial ointment to move hair away from the injury will assist in wound visualization and closure.

Irrigation

Proper irrigation can significantly reduce the risk of wound infection. This is achieved through the application of the irrigant in large volumes at a sufficient pressure to reduce or eliminate particulate matter and bacterial loads from the wound. The pressure needed to adequately irrigate a wound should be 5 to 8 psi and may be achieved with a 16- to 19-gauge catheter attached to a 35- to 65-mL syringe [46–48]. Sterile saline remains the most commonly used irrigant. However, tap water may also be used with no significant increase in the incidence of infection [49–51]. Application of povidone-iodine, hydrogen peroxide, or detergents should be avoided because of their tissue toxic properties and because they have not been associated with lower infection rates [52].

Debridement

Debridement is yet another means to improve healing, aesthetic outcome, and to decrease risk of infection. This is performed by removing devitalized tissue that is otherwise unable to resist infection [53]. Methods of mechanical debridement include simple surgical excision as well as previously detailed "high pressure" irrigation. If there is any question as to the extent of tissue devitalization, a "wait-and-see" approach may be considered to limit the amount of tissue excised.

Wound closure

Overview

The art of proper wound closure is a learned skill that is developed and enhanced throughout a career in medicine [54]. Laceration repair in the ED is typically performed using primary closure, which involves immediate approximation of the edges of the wound to improve the rate of healing as well as aesthetic appearance. There are characteristics of the wound that should be accounted for to clinically determine whether or not primary closure can be safely implemented. These factors include location, the degree of contamination, and time from injury to laceration closure, as well as the patient's predisposing medical conditions. A recent study demonstrated that the presence of a foreign body and wounds with increasing widths were at greater risk for infection [8–10,55].

Time since wounding

There is varying literature on when or if to close wounds that are delayed in their presentation to the ED. Lammers and colleagues [56] found that wounds older than 10 hours were at a higher risk for infection (8 hours in the hand). The current American College of Emergency Physicians policy on penetrating extremity wound management recommends that primary closure be completed no more than 8 to 12 hours from the time of injury. Wounds that are at low risk for infection, such as those on the face, scalp, and trunk with minimal contamination, may be safely approximated up to 12 hours after the time of injury. Likewise, wounds that are at moderate risk for infection, such as those on the extremities with poor vascular supply, contaminated wounds, or wounds in an immunocompromised patient, may be closed primarily after thorough cleansing within a 6- to 10-hour period [57].

Clinical judgment, however, may allow the time period for primary repair in certain situations to be extended up to 20 hours from time of injury. One such example would be a clean wound on the face in an otherwise healthy patient without infection risk factors. This is in contrast to a diabetic patient with a 1-hour old, contaminated wound that may not be a candidate for primary closure. The time range ideal for closure therefore depends on each individual situation [58].

Delayed primary closure

On occasion, high-risk wounds may be best treated using a delayed primary closure technique 3 to 5 days after injury, once the risk of infection has decreased. This method is especially suitable for wounds that are large or have a higher potential for poor cosmetic outcome. Delayed primary closure should also be implemented if there is any question as to the extent

a patient may develop a wound infection [58]. Further detail will be discussed in the advanced wound management article.

Selection of sutures

Suture placement is the most common method used for primary wound closure and is performed using one of several techniques and different types and sizes of suture material. The appropriate suture material and placement technique used should be based on the location, size, nature, and level of contamination of the wound, as well as the personal preference of the treating health care provider [4,8]. Nonabsorbable suture material, such as nylon and polypropylene, retain most of their tensile strength for more than 60 days and must be removed. This type of suture is relatively nonreactive and used to close the outer layer of the wound.

Absorbable sutures are used to approximate the wound deep to the epidermis. There are two general types of absorbable suture: synthetic (polydixanone and polyglyconate) and natural (cat gut). Synthetic absorbable suture retains its tensile strength for long periods and is useful in areas of high static and dynamic tensions. Because the synthetic absorbable suture lasts longer, it should be designated for approximating deep structures as they may be extruded by the body over time if left too superficial. Absorbable sutures are also useful for subcuticular stitches and to avoid suture removal in children. Equally acceptable cosmetic results were found when absorbable suture was compared with the use of nonabsorbable suture in pediatric facial laceration repair [59]. Synthetic and monofilament sutures are preferred over their braided counterparts as they are less likely to harbor infection.

Deeper sutures reduce skin tension and decrease potential spaces where hematomas may accumulate. Generally, deep sutures improve cosmetic outcome by reducing the overall width of the eventual scar. Caution, however, should be taken to avoid placing deep sutures in highly contaminated wounds because of the associated increase risk of infection [60]. In patients with a history of keloid formation, the wound should be approximated with minimal tension and a pressure dressing placed over the wound for 3 to 6 months to attempt to prevent development of another keloid [11].

Several technical principles should be adhered to achieve the best possible cosmetic outcome. For example, when placing sutures, the wound margins should be slightly everted to promote healing and to reduce the chance of creating a depressed scar. Sutures should be placed snuggly enough to approximate wound edges, but not so tight to cause tissue necrosis. Wound aesthetics are also improved when the knots of deep sutures are adequately buried. The smallest possible size of the chosen suture type capable of approximating the wound should be used to minimize scarring.

Alternative wound-closure techniques

Staples

Staples are a popular method for wound closure in the ED because of their rapid placement, when compared with sutures, and are particularly useful for wounds in the scalp, especially in children [61]. Trunk and extremity wounds may also be closed with staples. However, staples are associated with more noticeable scars, as they are not as meticulously placed as sutures, and more painful removal [37].

Surgical tape

Surgical tape, such as "steri-strips," can be a useful alternative to staples in areas of low skin tension. However, tape alone is usually not effective and should be used in conjunction with adhesives, such as tincture of benzoin. Unfortunately, tincture of benzoin may precipitate a local skin reaction. Surgical tape is typically placed perpendicular to the wound and in strips parallel to each other. It has been noted, however, that in certain wounds on the back and chest, this method can lead to blistering secondary to an increased shearing effect of the surgical tape. Blistering was not present when the surgical tape was placed parallel to the wound edges on wounds in the same anatomical locations [62]. The tape should be left in place until it falls off. Disadvantages with this method of closure include the inability to place the tape on areas with significant hair as well as inability of the patients to get them wet [37]. Recent studies have suggested that steri-strips may be as useful as tissue adhesive for facial lacerations in the pediatric population; however, this topic has not been fully studied leaving this conclusion presently unsubstantiated [63,64].

Cyanoacrylates

Cyanoacrylates are tissue adhesives that were approved by the Food and Drug Administration for use in the United States in August 1998 and allow for the painless and rapid approximation of select simple wounds [65,66]. Removal is not required as the keratinized layer of the epithelium sloughs off with the cyanoacrylate in 5 to 10 days. Tissue adhesives should be placed topically with care taken to avoid placement in the wound or between the wound margins. Applying too much of the tissue adhesive can cause an exothermic reaction. For optimal results, the tissue adhesive should be applied in three to four layers in a dry, bloodless field. Picking, scrubbing, and soaking the area should be avoided. Applying petroleum jelly or antibiotic ointment is not recommended and will actually accelerate removal. If rapid removal of the tissue adhesive is desired, acetone may also be effective [55].

Octyl-cyanoacrylate has one of the greatest tensile strengths of the tissue adhesives and has been found to provide excellent aesthetic outcomes when repairing facial lacerations with similar aesthetic outcomes, infection, and dehiscence rates when compared with sutures 3 months and 1 year after repair [67,68]. Plastic surgeons have observed better long-term aesthetic results

with cyanoacrylates after elective facial plastic surgery when compared with sutures [69,70]. Another study found no change in overall cosmetic outcome when tissue adhesive was compared with both nonabsorbable and absorbable sutures [71]. Octyl-cyanoacrylates may be used in other areas of the body with low skin tension, but the wound may require deep absorbable sutures to alleviate surface skin tension. Tissue adhesives should be avoided in wounds overlying sites of repetitive motion such as joints and the hands [72]. Cyanoacrylates are also advantageous because they possess antimicrobial properties toward gram-positive bacteria [73,74]. However, as discussed previously, standard wound preparation and cleansing should still be implemented before repair. Overall, cyanoacrylates are easily applied, thus improving ED efficiency with decreased overall cost when compared with suturing and staples. This technique is also the preferred method of wound closure by most patients [75].

Hair apposition technique

The hair apposition technique (HAT) effectively uses tissue adhesives to rapidly and efficiently approximate the edges of wounds located in the scalp. The wound is closed by twisting together the hair on each side of the scalp laceration. The twist is then secured with tissue adhesive. Despite the nearly painless technique of this procedure, local anesthesia may still be required to adequately examine the wound. Hemostasis is also difficult to achieve with this technique and should not be used in significantly bleeding wounds [76]. The advantages of the HAT include a shorter procedure time, less pain, no need for removal of stitches, and similar or superior wound healing when compared with sutures that is otherwise cost-effective with reported high patient satisfaction [77,78].

Wound care

Postrepair wound care is critical to the overall cosmetic outcome of the wound. Repaired wounds should have a nonadherent dressing placed for 24 to 48 hours to ensure adequate epithelialization and to prevent contamination of the wound. Topical antibiotics may be placed on the wound during this 24- to 48-hour period of re-epithelialization and have been shown to lower infection rates [79]. It should be reiterated that wounds treated with tissue adhesive should not be exposed to antibiotic ointments.

Wounds should be kept clean and dry. Patients should avoid soaking or scrubbing the wound, especially with tissue adhesive, as it may loosen the closure. Gentle blotting of the wound with a towel is recommended over repetitive wiping of the wound. Patients should also be given strict instructions to monitor for signs of infection, to include increased warmth, erythema, pain, swelling, or drainage from the wound.

Prophylactic parenteral antibiotics are not recommended for routine laceration repair as described by Nakamura and Daya elsewhere in this issue.

Table 3
Location and optimal time (days) to suture removal

Location	Days
Scalp	7–10
Face	3–5
Chest/Back/Abdomen	8–12
Extremities	8–12
Hand/Fingers	8–10
Foot	10–12

Clinical concern may govern whether antibiotics should be prescribed based on the degree of wound contamination (such as exposure to soil or fresh water), host risk factors, and the mechanism of injury. It should be reinforced that wound preparation with decontamination will be far more beneficial in preventing infection than antibiotics. Antibiotics should, however, been given to patients with wounds secondary to human bites, cat bites, and some dog bites, as well as wounds with underlying open fractures and exposed joints and tendons [80–82].

Sutures and staples should be removed according to the time frame outlined in Table 3. Scars that may be exposed to sunlight should be protected with sunscreen for at least 6 to 12 months to minimize subsequent hyperpigmentation [4].

Summary

The primary objectives of basic wound management center around promoting optimal wound healing and cosmesis. These objectives may be achieved through systematic assessment, preparation, and repair of the laceration supplemented with appropriate patient care instructions. The meticulous and methodical management of traumatic wounds described in this article will assist the emergency physician in decreasing overall complication rates and help improve patient satisfaction.

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